

ABSTRACT

A method and apparatus are disclosed for frequency offset estimation and interleaver synchronization, using periodic signature sequences, such as Barker codes. The
5 periodic signature sequence is used for interleaver synchronization or frequency offset estimation or both. The periodic signature sequence is transmitted over a certain number of bins in both the upper and lower sides of the DAB signal. Since the signature sequences are assigned to specific bins known to the receiver, any shift of the correlated peak from the expected location due to frequency offset errors can be estimated by the frequency offset algorithm. If the Barker
10 sequence is placed, for example, in the last column of the DAB interleaver, the location of the Barker sequence upon correlation of the received digital signal identifies the beginning of an interleaver block. A Barker sequence is transmitted over a signature frame every L data frames on each side band, where L is generally the number of OFDM frames that can fill the interleaver memory. If the maximum frequency offset is M, then the frequency offset algorithm utilizes a search window of size $n + 2M$ (between bins $N-M$ through $N + n + M$), and attempts to maintain the Barker sequence in the center of the search window. At the receiver, the Barker sequence is mapped to the OFDM signature bins that do not belong to uncertainty regions (the group of bins that can fall out of the receiver processing range for maximum positive and negative frequency offset values). Thus, the Barker sequence bins are processed by the disclosed receiver as long as the frequency offset does not exceed the specified maximum frequency offset.